USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2006IL134G

Title: Evaluating Alternatives for Watershed-Scale Design of BMPs

Project Type: Research

Start Date: 08/16/2006

End Date: 08/15/2008

Congressional District: 12th District, IL

Focus Categories: Management and Planning**,** Hydrology, Models

Keywords: Best Management Practices, Decision Support

Principal Investigator: Nicklow, John William (Southern Illinois University at Carbondale)

Federal Funds: $90,948

Non-Federal Matching Funds: $91,755

Abstract: Stormwater runoff has received significant attention in recent years due to an improved understanding and increased public awareness of its potential impacts. A significant outcome of recent federal and state programs that target the reduction of these impacts is an emphasis on and guidance for Best Management Practices (BMPs). Passive treatment, or structural, BMPs such as detention basins, wetlands, filter strips, and swales have become common control measures. It is well-recognized that such systems are most cost effective when designed and implemented in strategic regional or watershed-scale combinations. Unfortunately, in practice, these controls are more typically designed to solely focus on controlling impacts on individual properties and fail to consider larger spatial impacts or interactions with other BMPs. This is, in part, because no generalizable methodology exists for optimal selection, placement, and sizing of watershed-scale BMP combinations. The objective of this two-year research effort is to develop a methodology and a publicly-available decision support model capable of directly and efficiently identifying the least-cost combination of different BMPs, including types, sizes, and locations within a basin, that is capable of meeting prespecified water quality goals (e.g., reduced peak flows and sediment and nutrient loads) at various defined locations within the watershed. The model will

be developed by coupling a modified version of the USDA's Soil and Water Assessment Tool with an evolutionary search algorithm. In addition, to promote satisfaction of other, potentially unquantifiable stakeholder objectives, a series of near-optimal (i.e., similar cost) alternatives that vary maximally from a design perspective will be generated. The designer is, in the end, provided with a list of cost-effective BMP combinations that could be used to help alleviate stormwater impacts. In particular, the approach could be used to determine the most cost-effective means of meeting Total Maximum Daily Load (TMDL) criteria, or could assist in the process of establishing feasible TMDLs. Although the model will be transferable to other watersheds, it will be developed for and tested on the Lower Kaskaskia watershed in southwestern Illinois. The model and demonstrative results will be shared with federal and state agency personnel, concerned local stakeholders, and the wider water resources community through regional meetings and workshops, an outreach bulletin, nationally-organized conferences, and other refereed publications.
